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SEI TECHNOLOGIES FORUM

Software Engineering Institute | Carnegie Mellon

Software, Security, and Resiliency

Paul Nielsen
SEI Director and CEO

Dr. Paul D. Nielsen is the Director and CEO of Carnegie Mellon University's Software Engineering Institute. Under Dr. Nielsen's leadership, the SEI has expanded its research, doubled its staff and increased its impact in the software engineering community. The SEI now has over 500 valued partnerships with organizations extending its influence globally. Prior to joining SEI in 2004, he served in the U.S. Air Force, retiring as a major general and commander of Air Force research after 32 years of distinguished service. Nielsen is a member of the US National Academy of Engineering (NAE) and a Fellow of both the American Institute of Aeronautics and Astronautics (AIAA) and the Institute for Electrical and Electronics Engineers (IEEE).

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Software and Complexity

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The Rise of Complexity

- Scale
- Interconnectedness
- Autonomy
- Time criticality
- Security
- Safety
- Regulation

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How to Handle Complexity

Models

Process

Architecture

Risk assessment

Resiliency

Evolution

People

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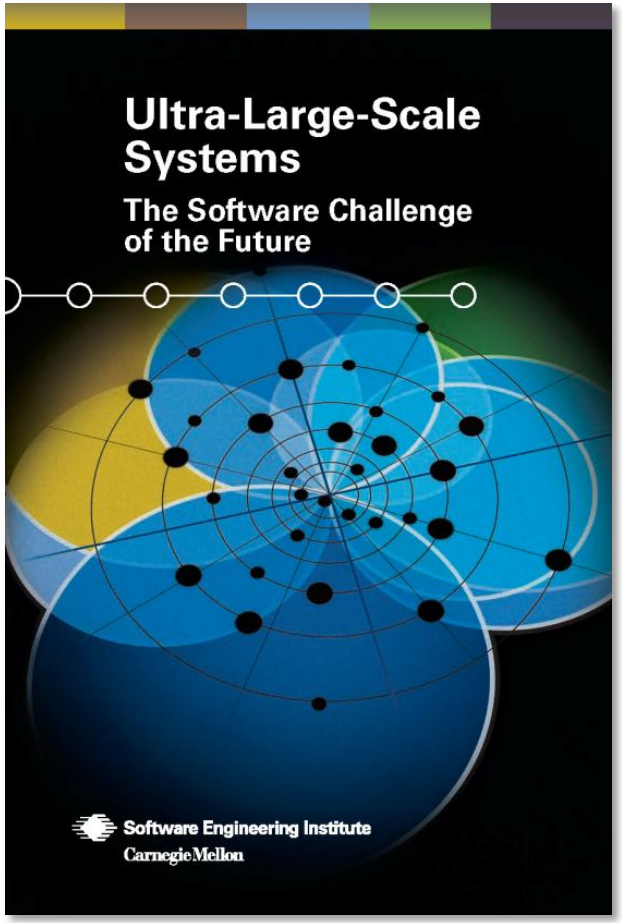
Complex Systems at the SEI



The SEI is at the nexus of systems and complexity:

- We study them side-by-side
- For 25 years, we've been helping engineers design and manage software systems
- It's our job to "ring the bell" on the importance of managing complexity

We also appreciate risk and the importance of managing it

- Continuous risk management
- Mosaic suite of risk management tools
- Multi-view models
- Mission Success in Complex Environments

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Security and Risk

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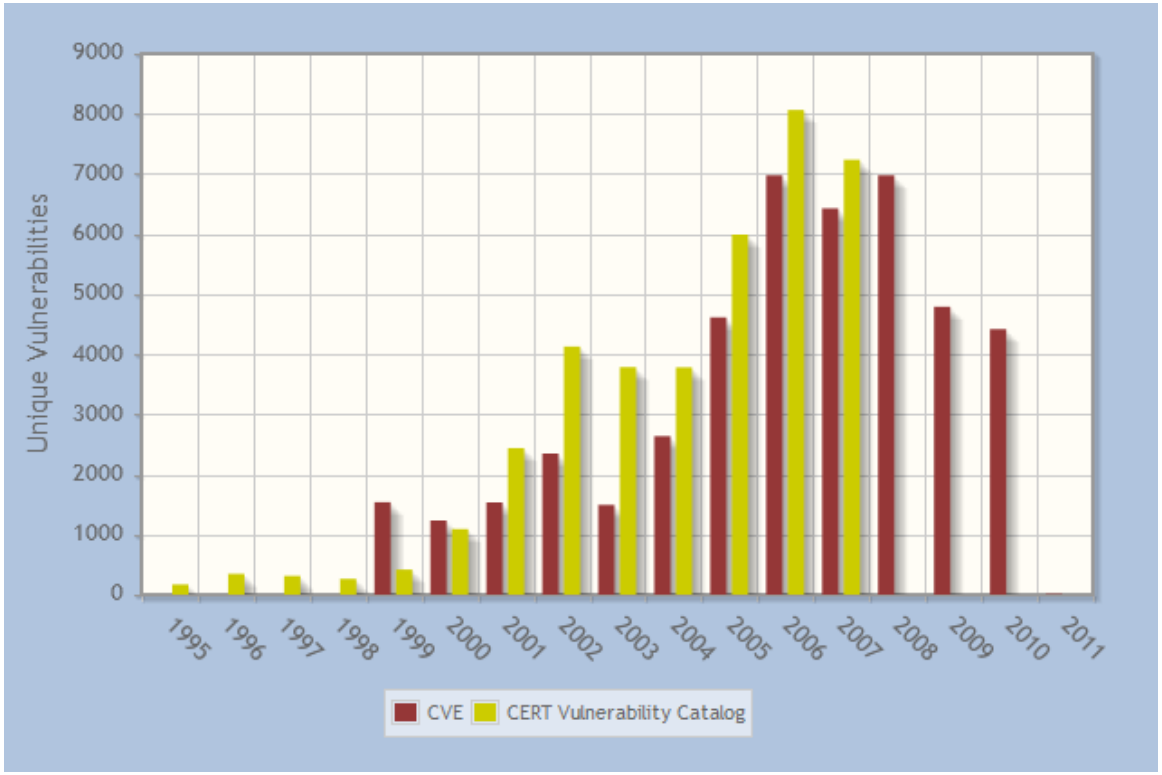
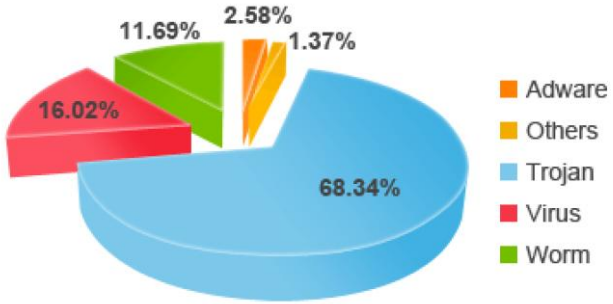
Rising Tide of Vulnerabilities, Risk



Unique Vulnerabilities
(from CERT and NIST NVD data)



Recent Pandalabs Analysis of
Malware, Viruses in Circulation

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How to Handle Cyber Security Issues

Secure Coding

Malware Identification and Analysis

Network Situational Awareness

Recognizing Insider Threats

Modeling Resiliency and Continuity

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Resiliency and Continuity

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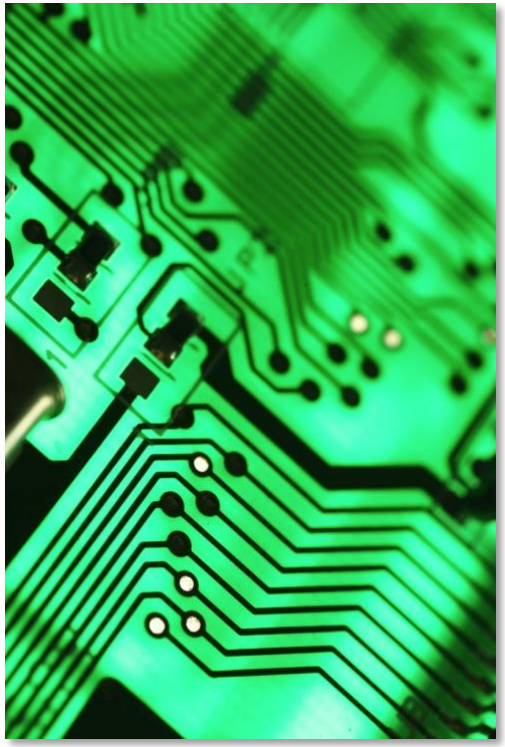
Key Principles of Resiliency (1)



Resilience is the ability to provide and maintain an acceptable level of service in the face of faults and challenges to normal operation.

At SEI, both organizational and software:

- Resilience Maturity Model (RMM)
- Security Quality Requirements Engineering (SQUARE)
- **security "built in"**
- Current blog series topic (http://blog.sei.cmu.edu/)
- **failure scenarios understood, planned for**
- **redundancy is provided for in key areas**
- **capability remains available under adverse conditions**

resilience

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Continuity

A key aim of resiliency (and managing operational risk)

Business Functions:

- Developing and executing continuity plans, recovery plans, and restoration plans

IT Function:

- Developing, implementing, and managing processes to deliver IT services and manage IT infrastructures

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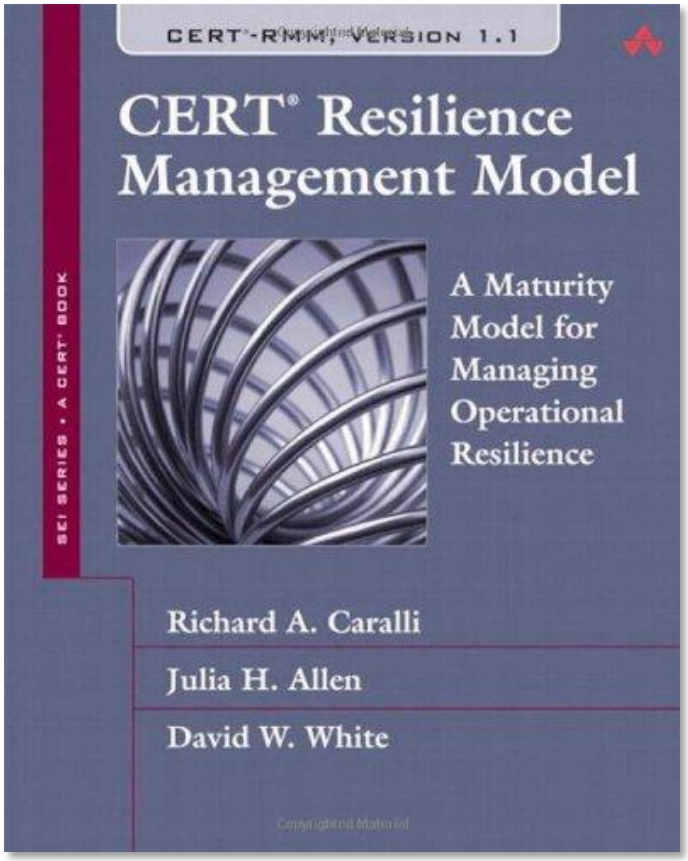
Resiliency Maturity Model (1)



What is CERT-RMM?

CERT-RMM is a maturity model for managing and improving operational resilience.

- Guides implementation and management of operational resilience activities
- Converges key operational risk management activities: security, business continuity/disaster recovery, and IT operations
- Defines maturity through capability levels (like CMMI)
- Improves confidence in how an organization responds in times of operational stress

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Connecting the Dots

Today's presentations include:

Understanding and coping with complexity & cyber security

- CMMI-SVC: The Strategic Landscape for Service
- Software Acquisition Program Dynamics
- Architectural Implications of Cloud Computing
- The Insider Threat: Lessons Learned from Actual Insider Attacks

Dealing with the smart grid, resiliency and software development

- Smart Grid Maturity Model
- Agile Development and Architecture: Understanding Scale and Risk
- Measuring Operational Resilience
- Team Software Process (TSP)

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Contact Information

Paul Nielsen
Director and CEO
Software Engineering Institute
Telephone: +1 412-268-7740
Email: nielsen@sei.cmu.edu

U.S. Mail
Software Engineering Institute
Customer Relations
4500 Fifth Avenue
Pittsburgh, PA 15213-2612
USA

Web
www.sei.cmu.edu
www.sei.cmu.edu/contact.cfm

Customer Relations
Email: info@sei.cmu.edu
Telephone: +1 412-268-5800
SEI Phone: +1 412-268-5800
SEI Fax: +1 412-268-6257

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